



How are data-driven pricing strategies adopted by the companies of today and how do these strategies overcome the limitations of traditional pricing strategies?

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Abstract

Price is a vital component for all businesses selling goods and services as it has an impact on consumer purchasing behaviour. That being said, pricing decisions are intricate since they are influenced by multiple factors such as supply and demand, cost structures, consumer behaviour, competitive analysis, distribution channels, etc. The majority of the traditional pricing strategies have proven to be effective but may be limited in their ability to only consider a limited few factors. In light of the same, data-driven strategies have gained a great level of importance for their ability to account for most, if not all, of the price influencing factors in real-time and provide more efficient pricing decisions for companies worldwide. This research paper sets out to explore the aforementioned further in the context of global companies such as Uber and Amazon.

Introduction

Price represents the value or worth that is assigned to a particular product or service. Price is the first feature of a product a consumer views (The Economic Times, 2019). If the price is set too high, then it will lead to the customer not wanting to purchase the item. The pricing of commodities, products or services is affected by several factors such as production costs, profit margins, supply and demand dynamics, cost structures, distribution channels, etc. (Pricing Research Lab Sciative, 2023). Firms would most ideally take into consideration most of these factors whilst choosing their pricing strategy which is a method used to determine the most optimal price for a product or service. Traditionally, there are several pricing strategies available. For instance, Penetration Pricing entails a price reduction

at the launch of a product with the expectation that prices will increase after reaching market share goals whereas in the Skimming Strategy, the price is set high initially to maximize revenue and is reduced when competitors enter the market to prevent profit loss (The Economic Times, 2019). Ultimately it is the pricing strategy that will take into consideration all of the influencing factors when setting a price that will have a beneficial impact on the revenue and profits of the company.

In line with the aforementioned, the different factors influencing price require a very thorough analysis of big data and to a certain extent the more traditional pricing strategies may not have been developed to consider this. Therefore, as the amount of data available to companies has increased, there has also been a requirement for more effective pricing strategy approaches to be developed. The answer to this may be found in data-driven pricing strategies. This paper aims to answer the research question **“How are data-driven pricing strategies adopted by the companies of today and how do these strategies overcome the limitations of traditional pricing strategies?”**

This paper aims to conduct a comprehensive review and analysis of data-driven pricing strategies along with an evaluation through case studies of their application by companies such as Uber and Amazon.

A Review of Factors that Influence Pricing Decisions

The decisions of consumers are guided by prices. Price is an element of marketing which is very flexible. Due to its flexibility, it allows for quick adaptability to market dynamics and serves as a primary driver of revenue. A seller can overcome their competitors by fixing an attractive price point for a product, serving as an essential tool. As mentioned above there are several factors which affect or influence pricing strategies some of them are as follows:

Supply and Demand Dynamics

The relationship between available goods and their demands affects the prices of goods. When there is high supply and low demand, the price of the product decreases but when there is a low supply and high demand, the price increases (Kramer, 2023). It is necessary to be aware of this as when prices change due to supply and demand, one can make a more comprehensive purchase. Moreover, the effect of supply and demand on the price of a product is not the only factor, instead, even the price elasticity of the product is essential to consider. Price elasticity of demand is the measure of how much a product is bought by people when there is a price change. Goods that are price inelastic will witness a smaller decrease in demand when the price is increased in comparison to goods that are price elastic (Kenton, 2020). For example, the demand for gasoline shows low price elasticity, as consumers tend to maintain their buying patterns even if the price increases due to gasoline being essential.

Cost Structures

Cost structure involves all the costs linked with selling a product or service. Cost Structures help in categorising these costs (Sharma, 2023). Products have certain individual features which are their characteristics. Analysis of the cost of a product is essential before pricing that product. For instance, some companies may adopt a strategy whereby they set a low price for their goods/services in the hope of selling volumes. The price of a product will depend upon the life cycle of that product, the nature of the product, how diverse the product is and its cost. However, if the cost of production is too high then in the long run, such a strategy may not be deemed feasible and instead threaten the survival of the company.

Competitive Analysis

Competitive analysis is an examination of your competitor's operations. Competitors may have similar products or substitutes of a product which challenges their sales and consumption (White, 2022). Sometimes companies might end up in a price war which is when a company and its rival company keep lowering their prices to try to undercut each other. This is a strategy which companies use to increase market share (Kenton, 2019). Another strategy which is used by companies is price discrimination. Price discrimination is when companies charge different customers different prices according to what the seller assumes they will pay for the product (Twin, 2022). Using competitive analysis, a company can recognise its competitor's strengths and weaknesses and use that data to determine prices for its products or services.

Consumer Behaviour

The study of how consumers buy, choose or use products or services and their behavioural responses is known as consumer behaviour. Understanding consumer behaviour helps in knowing what influences consumers' buying choices. When prices of products affect consumers purchasing behaviours to a certain degree it is known as price sensitivity. There will be less sensitivity towards the price when the product is distinct or rare but there will be high sensitivity towards the price of the product when it has a high cost or is found in abundance.

Distribution Channels

A distribution channel is a pathway through which a product or products, to other businesses or middlemen, are dispersed to reach the customer. For example, if a company manufactures shirts and sells them directly through an e-commerce website such as Amazon. Distribution channels assist in the distribution of the product, reach more customers in the market, instil customer satisfaction, product promotion and increase the availability of the goods in

the market. If the distribution channel is large, the product's price will be high; if the distribution channel is comparatively smaller, the product's price will be lower compared to the product with the larger channel of distribution.

An Introduction to Data-Driven Pricing

Traditional pricing strategies are functional strategies but they do have their setbacks. Traditional pricing strategies are unilateral as they consider only one or a handful of factors which influence pricing. On the other hand, data-driven pricing strategies are strategies which help set the price of a product by taking into consideration multiple sets of data. More specifically, such pricing strategies involve the use of data analytic tools such as artificial intelligence, machine learning, deep learning, etc. to determine the most optimal pricing strategy for individual products. In doing the aforementioned, data-driven pricing strategies incorporate various factors pertaining to the consumers such as their preferences, needs, location, price sensitivity, history and many more (LinkedIn, 2023). Additionally, this strategy takes into consideration the supply and cost of a product, the strategic objectives of the business and the competitive dynamics. All in all, by being multi-lateral in their approach, these strategies may help in making more accurate pricing decisions. Moreover, the pricing decisions based on data-driven strategies can also be deemed more relevant as the algorithms can be adjusted to reflect real-time data and market trends.

In today's world, there are an increasing number of industries and companies making use of data-driven pricing strategies given the fact that we live in a time of big data and that value can be derived from this data if corrective analytical tools are applied to it. The remainder of this paper, therefore, aims to analyse the manner in which the ride-sharing economy - through the example of Uber - and the e-commerce industry - through the example of Amazon - make use of selective data-driven pricing strategies and the varying advantages and drawbacks associated with such strategies.

An Analysis of Data-Driven Pricing in the Rideshare Economy

A shared economy is an economic model where groups and individuals share goods and resources in a collaborative method. There is usually the use of an online platform which connects the seller and buyer (Scott, 2020). Within the shared economy is a term called Ridesharing. Ridesharing is a service in which a driver transports you from one place to another. It follows the sharing economy business model as car ownership costs are distributed among members who pay for transportation (Hu, 2020). As per an article written by Kennedy (2021), in the year 2016 in the United States, ridesharing apps such as Uber and Lyft surpassed the use of taxis for business travellers. In 2017, the popularity of ridesharing increased. In March 2019, Lyft became a publicly traded company and so did Uber two months later. Due to COVID-19, the rideshare economy took a hit. Uber reported that in the second quarter of 2020,

the business was 73% lower than last year. That being said, the global ridesharing market was valued at \$76.48 billion in 2020 (Fortune Business Insights, 2021) and \$85.8 Billion in 2021 (MarketsAndMarkets, 2021) and in 2023 it is projected to reach US\$154.00 Billion (Statista, 2023) - evidencing its continuing growth.

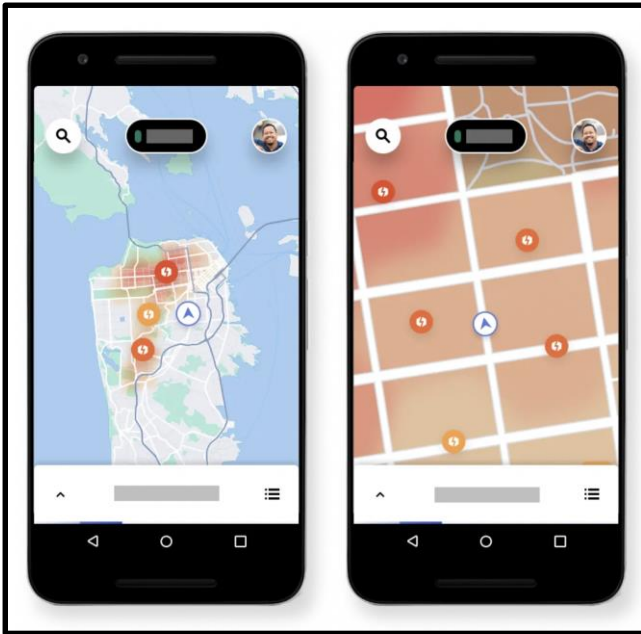
Taking the example of Uber, specifically, Uber's most valuable resource is data and its business model is based on the fundamental big data principle of crowdsourcing. As per ProjectPro (2023), Uber anticipates the time it takes for a driver to reach a given pick and drop-off location by predictive models. Uber has advanced routing and matching algorithms which guide both the drivers and riders from the time the app is opened until they reach the destination. Uber has employed a supplier pick map matching algorithm - customers select service variables, and the algorithm sends requests to the most optimal service providers. Each ride request is initially sent to the nearest Uber driver who is available, determined by comparing the rider's location with the expected time of the driver's arrival. This algorithm is effective for Uber since the transaction is highly commoditized, requiring minimal customer decisions before a match is made. Uber uses data to help in the efficiency of the company.

However, the use of data is most evident in the pricing decisions made and executed by Uber.

Uber's model relies on supply and demand dynamics unlike taxis, which lack incentives for drivers to work during peak demand. This leads to increased rates which entice more drivers when user demand is high (Leetaru, 2016). This concept is often referred to as 'price surges'. Simply put, price surges are when the price is increased to maximise revenue and to meet the high demand for a given product. This strategy is utilised by many companies in this economy (Guerrero, 2022). For example, Uber calculates surge prices by showing an additional surge amount, a multiplier to standard rates, or an upfront fare including the surge amount on the user's offer card. Since the price is updated depending on the real-time demand, the surge can quickly change (Uber, 2023). Price Surges are an effective strategy for Uber due to its strong correlation to the marketplace imbalance. Uber tries to balance the reliability for riders and drivers by first, charting every city into granular hyperlocal zones, which are compact hexagonal blocks. As the demand rises in an area, the units undergo a colour transition - which may be witnessed in the image to the above. The coloured areas of the map vary from light orange to dark red. Dark red indicates a high surge whereas light orange denotes a lower surge (Pattnaik, 2019). Second, since the surges are controlled via an algorithm, they are automatically activated when there is a shift detected in the availability of drivers and the demand of riders in real time. Third, as rider demand and driver availability are volatile, prices undergo frequent changes. Real-time updates help to ensure that rider fares align with supply and demand, providing transparency for both drivers and riders. Fourth, additional factors such as the existing availability of drivers and demand for riders are the primary inputs to surge pricing. However, Uber also incorporates predictions about market conditions. Furthermore,

in specific situations, such as major public safety emergencies, Uber evaluates the circumstances and may impose limits on surge pricing in the affected area.

Another method used is Price Differentiation which refers to setting different prices for the same product or service based on the customer's location, target market, etc. (Wells, 2022). There are multiple techniques or degrees involved



in Price Differentiation such as personalised pricing, which includes price differentiation according to information obtained about a potential customer (ROTT, STRYCHARZ and v, 2022), or first-degree price discrimination which involves selling the product at the exact price each customer is willing to spend (Horton, 2023). Price differentiation is also used by many companies in the rideshare economy, for instance, Uber uses a dynamic pricing algorithm that changes their rates depending on numerous variables in particular traffic, current demand from riders or drivers, route and distance, time of day or the distance and time of the user's route. This pricing model is hidden from drivers and riders and uses a machine-learning algorithm to anticipate the pay for its ride service and to vary fares based on

different routes (Chang, Winston and Yan, 2022).

An Analysis of Data-Driven Pricing in the E-Commerce Industry

E-commerce or electronic commerce refers to the buying and selling of goods and services over the Internet. This form of commerce operates in various market segments and can be conducted over smartphones, tablets, computers, and any other smart devices (Bloomenthal, 2023). E-commerce enables small businesses, start-ups, and large corporations to scale their product sales and connect with their customers on a global level (Amazon, 2023). It is estimated that 2.14 billion people worldwide purchase goods and services online (Coppola, 2021). E-commerce has helped bring about a lot of positive change in the commercial environment. For example, consumer behaviour has undergone significant changes in recent years, due to the rapid explosion of e-commerce. E-commerce provides convenience and accessibility for consumers. With a few simple clicks, individuals can explore a diverse range of products, compare the products and make purchases from the convenience of their own homes. These factors enable customers to have a more comforting time while shopping. E-commerce platforms utilise data analytics and artificial intelligence to provide a personalised shopping experience for the shopper. Advanced algorithms and customer profiling enable businesses to offer customised product recommendations, and targeted promotions, promoting brand loyalty and long-term customer relations (Tiwari, 2023).

One of the more prominent E-commerce companies is a company established in a garage in July 1994 by Jeff Bezos called Amazon (Yasar, 2022). Amazon, initially founded as an online bookstore, has transformed into an internet-based business empire and is the largest online retail provider in the world (Yasar, 2022). Amazon uses artificial intelligence, machine learning and big data analytics to excel as an e-commerce company. Amazon has a recommendation engine which uses machine learning algorithms to examine vast amounts of customer data, like browsing patterns, product ratings and purchase history. This enables Amazon to present relevant product suggestions, enhancing the chances for the customer to make a purchase (Ampofo, 2023). The data-driven strategy which is used by Amazon helps in predicting demand and managing inventory which has proven to optimize its supply chain operation and cut costs. By analysing external factors such as market trends and seasonality, Amazon can precisely anticipate product demand (Ampofo, 2023).

With regard to pricing, Amazon uses a sophisticated algorithm to evaluate and adjust the price of millions of products according to both historical and real-time market data which also identifies trends and generates precise predictions (Geysler, 2023). More specifically, the company uses a pricing strategy called dynamic pricing in which the price of a product or service is adjusted in real-time, responding to current market conditions. Retailers employ this strategy to optimize product prices, enhance conversion rates and boost overall revenue (Geysler, 2023). Dynamic pricing can be affected by the level of product demand and the availability or shortage of a product, the timing or day of the week of the purchase or the cost of similar products which are provided by competitors (Rajgopal, 2023). In this strategy, Amazon monitors the price of their competitors, customer demand and market trends and then adjusts its prices in real-time to remain a prominent figure in the e-commerce industry. Amazon takes various parameters into account when adjusting prices. These parameters consist of user values and global values. User values involve factors such as frequency of product visits and time of purchase whereas global values relate to elements such as demand and stock volume (Geysler, 2023).

Further to the above, Amazon's dynamic pricing tool offers two automated repricing options: the Competitive Price Rule or Pre-Defined Automated Pricing Rule, and the Create a Customized Pricing Rule. The competitive price rule ensures competitiveness by aligning with the Buy Box price, which refers to the current lowest price listed by a seller, comparing, external prices and adjusting to changes from other sellers. Meanwhile, the Create a Customised Pricing Rule empowers sellers to set repricing thresholds based on key principles such as lowest price, sales units and external price. This allows sellers to adapt their repricing strategy to align with their distinct business goals and competitive environment (Geysler, 2023).

Sellers on Amazon also depend on a third-party software tool which integrates with the platform to automate and implement dynamic pricing. These tools offer advanced features compared to Amazon's built-in repricing tool. This

software provides additional features like price history tracking, competitor analysis and Buy Box monitoring, which are not present in Amazon's built-in tool (Geysler, 2023).

Conclusion

Price, a valuation which is assigned to products or services, holds great importance for consumers, often shaping their decisions regarding buying goods and services. Pricing strategies are extremely useful tools to increase the profitability of a business. Traditionally, businesses relied on established pricing strategies like Penetration pricing and Skimming Strategy. However, the rise in the use of data has increased which helps in providing newer strategies. This paper aimed to conduct a comprehensive review and analysis of data-driven pricing strategies along with an evaluation through case studies of their application by companies such as Uber and Amazon.

Pricing decisions are intricate and influenced by factors like supply and demand, cost structures, competitive analysis, consumer behaviour, and distribution channels. While traditional strategies have their merits, the emergence of data-driven pricing represents a transformative shift. Utilizing artificial intelligence and machine learning, businesses can now consider a diverse collection of data points such as location, consumer preferences, and real-time market trends. This data helps to make precise and adaptable pricing decisions.

The cases of Uber and Amazon exemplify the efficiency of data-driven pricing. Uber employs surge pricing and dynamic algorithms, responding swiftly to demand fluctuations. Amazon's dynamic pricing, incorporating competitor analysis and user behaviour, exemplifies the adaptability granted by data-driven strategies in e-commerce. As industries are now exploring the uses of big data, the prevalence of data-driven pricing strategies will grow. Businesses adopting these approaches gain a competitive edge, aligning pricing with market dynamics, enhancing customer satisfaction, and driving revenue growth. The integration of data-driven insights into pricing not only mirrors current market conditions but also anticipates future trends, fostering a more resilient and adaptive pricing framework.

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